

Your Name _____

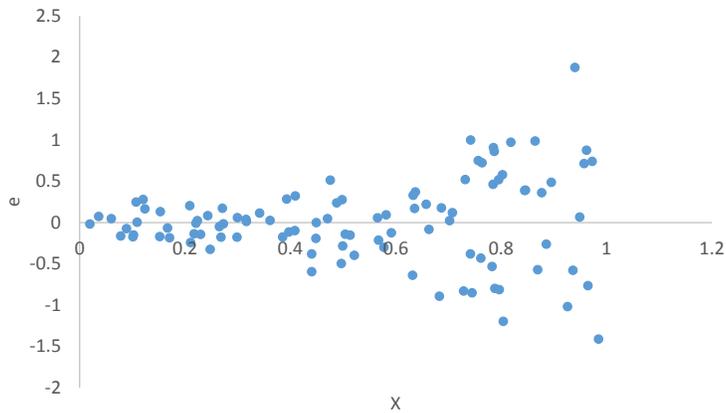
ARE 106
Econometric Theory and Applications
 Practice Final Exam, Part B, Winter 2017

You must work *completely independently*. You may need the 5% $\chi^2_{(d)}$ critical values, which are 3.84 ($d=1$), 5.99 ($d=2$), and 7.82 ($d=3$).

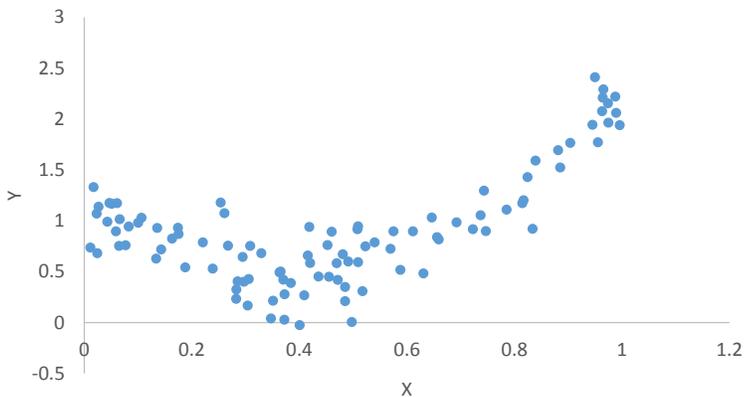
The plots in (1)-(4) were produced from the regression $Y_t = b_0 + b_1X_t + e_t$ using data measured over 100 time periods. Each plot uses different data. For each plot, circle the letter corresponding to any of (a)-(e) that appear to be true from the graph.

- a. Heteroskedasticity
- b. Correlated errors
- c. Regression function is nonlinear
- d. Non-representative sample
- e. OLS is BLUE

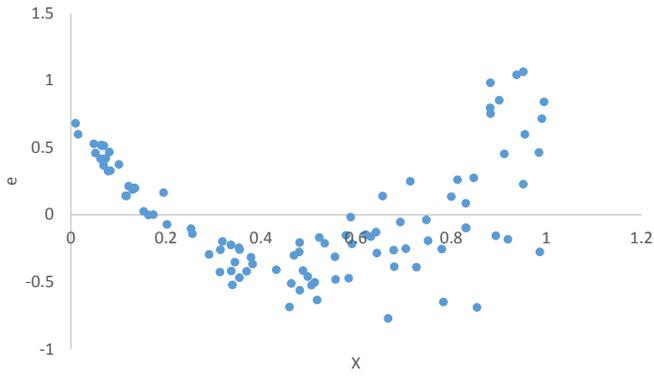
1. a b c d e **(7 points)**



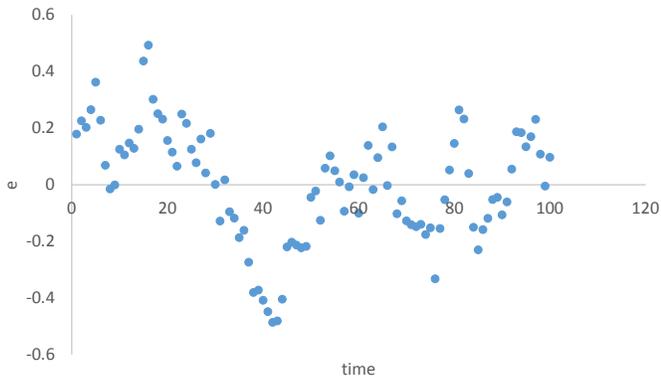
2. a b c d e **(7 points)**



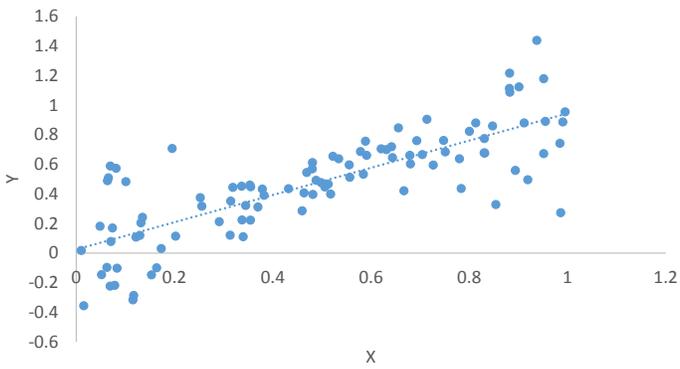
3. a b c d e (7 points)



4. a b c d e (7 points)



5. a b c d e (7 points)



Questions 6-9 relate to the Shazam output below, which came from the regression $Y_t = b_0 + b_1 X_t + e_t$ using data measured over 100 time periods.

```
|_ ols y x/ resid=res

REQUIRED MEMORY IS PAR=          6 CURRENT PAR=          781
  OLS ESTIMATION
    100 OBSERVATIONS      DEPENDENT VARIABLE= Y
...NOTE..SAMPLE RANGE SET TO:      1,      100

R-SQUARE =      0.8048      R-SQUARE ADJUSTED =      0.8029
VARIANCE OF THE ESTIMATE-SIGMA**2 = 0.19430E-01
STANDARD ERROR OF THE ESTIMATE-SIGMA = 0.13939
SUM OF SQUARED ERRORS-SSE=      1.9041
MEAN OF DEPENDENT VARIABLE =      0.46612
LOG OF THE LIKELIHOOD FUNCTION =      56.1634

VARIABLE      ESTIMATED      STANDARD      T-RATIO      PARTIAL STANDARDIZED ELASTICITY
  NAME      COEFFICIENT      ERROR      98 DF      P-VALUE CORR. COEFFICIENT AT MEANS
X          0.93234      0.4638E-01      20.10      0.000 0.897      0.8971      0.9825
CONSTANT   0.81516E-02      0.2671E-01      0.3052      0.761 0.031      0.0000      0.0175

|_ genr lagx=lag(x)
|_ genr lagy=lag(y)
|_ genr lagres=lag(res)
|_ sample 2 100
|_ ols res lagres x

REQUIRED MEMORY IS PAR=          9 CURRENT PAR=          781
  OLS ESTIMATION
    99 OBSERVATIONS      DEPENDENT VARIABLE= RES
...NOTE..SAMPLE RANGE SET TO:      2,      100

R-SQUARE =      0.4843      R-SQUARE ADJUSTED =      0.4735
VARIANCE OF THE ESTIMATE-SIGMA**2 = 0.10230E-01
STANDARD ERROR OF THE ESTIMATE-SIGMA = 0.10114
SUM OF SQUARED ERRORS-SSE=      0.98204
MEAN OF DEPENDENT VARIABLE =      0.34306E-04
LOG OF THE LIKELIHOOD FUNCTION =      87.8805

VARIABLE      ESTIMATED      STANDARD      T-RATIO      PARTIAL STANDARDIZED ELASTICITY
  NAME      COEFFICIENT      ERROR      96 DF      P-VALUE CORR. COEFFICIENT AT MEANS
LAGRES      0.68555      0.7330E-01      9.352      0.000 0.690      0.6855      -3.2571
X          -0.54889E-01      0.3367E-01      -1.630      0.106-0.164      -0.1195      -784.3196
CONSTANT    0.27053E-01      0.1938E-01      1.396      0.166 0.141      0.0000      788.5767
```

6. Conduct a Breusch-Godfrey test for autocorrelation. Be sure to write down the null and alternative hypotheses, the test statistic and your conclusion. **(10 points)**

7. Describe the implications of the result of your test in (6) for the OLS estimate b_1 . **(10 points)**

8. The regression output below implements the Newey-West correction for correlated errors. Explain what is different and why it is different between these results and the results given earlier. **(10 points)**

```
|_ ols y x/ resid=res autocov=10
```

```
REQUIRED MEMORY IS PAR=          6 CURRENT PAR=          781
OLS ESTIMATION
  100 OBSERVATIONS    DEPENDENT VARIABLE= Y
...NOTE...SAMPLE RANGE SET TO:      1,      100
```

```
R-SQUARE =      0.8048      R-SQUARE ADJUSTED =      0.8029
VARIANCE OF THE ESTIMATE-SIGMA**2 =  0.19430E-01
STANDARD ERROR OF THE ESTIMATE-SIGMA =  0.13939
SUM OF SQUARED ERRORS-SSE=    1.9041
MEAN OF DEPENDENT VARIABLE =  0.46612
LOG OF THE LIKELIHOOD FUNCTION =  56.1634
```

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 98 DF	P-VALUE	PARTIAL CORR. CORR. COEFFICIENT	STANDARDIZED COEFFICIENT	ELASTICITY AT MEANS
X	0.93234	0.8638E-01	10.79	0.000	0.897	0.8971	0.9825
CONSTANT	0.81516E-02	0.4671E-01	0.1745	0.860	0.031	0.0000	0.0175

9. Explain how you could add lagged variables to the model to fix the autocorrelation problem you found in (6). **(10 points)**

10. Suppose we are interested in using years of education to predict hourly wages using the regression $wage_i = \beta_0 + \beta_1 educ_i + \varepsilon_i$. We are interested in the population of all full-time workers. Our sample was randomly selected from the set of full-time workers who make more the \$10/hour. Does Assumption CR1 (representative sample) hold? If the assumption fails, describe the implications for your analysis. **(10 points)**

11. Each of the following sentences omits either the word “correlation” or the word “causation”. Fill in the missing word. **(5 points)**

_____ means that if you tell me X, I can make a prediction of Y.

_____ means that if you change X to a different value, then I expect Y to change.

12. State the conditions that a good instrumental variable needs to satisfy. **(10 points)**